INVENTIONS & INNOVATION

Project Fact Sheet

Fuel Preprocessor (FPP) for a Solid Oxide Fuel Cell Auxiliary Power Unit

A FUEL PREPROCESSOR FOR FUEL CELL AUXILIARY POWER UNIT CAN SAVE THE TRUCKING INDUSTRY BILLIONS OF DOLLARS

Benefits

- Offers savings of 2.4 trillion Btu by 2010
- Allows the use of diesel fuel as an input to the SOFC auxiliary power unit

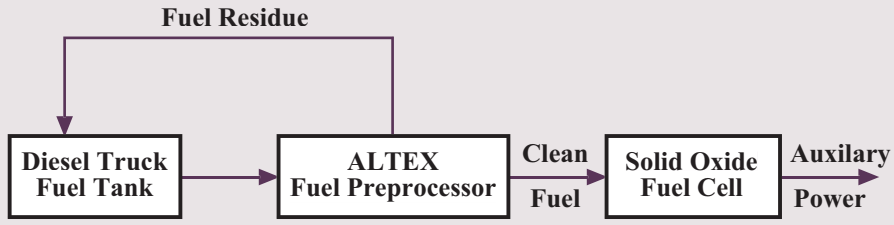
Applications

The broad application use for the FPP includes other transportation industries and any other industry that utilizes fuel cell technology.

Currently, trucks have to operate at idle to produce the needed electricity, heat or air conditioning for the driver's sleeper compartment. Large amounts of diesel fuel are used for this purpose with high costs to the trucking industry and pollution to the environment. Instead of idling, Solid Oxide Fuel Cell (SOFC) auxiliary power units could be incorporated into trucks. However, fuel cells are not able to operate on the readily available diesel fuel. The FPP proposed under this program, upgrades diesel fuel to a clean fuel so that it can be used in a SOFC auxiliary power system. Although the FPP is initially targeted for this application, it is flexible and can be integrated with other fuel cell systems, to make them fuel flexible.

Under this project, the FPP design will be refined and a prototype FPP unit will be built and tested by Altex Technologies Corporation. Test results will be used to evaluate the system performance, cost and its impact on the transportation sector and other industries. Armed with these results, Altex will embark on the commercialization of the technology.

FPP/SOFC APU Process



FPP produces a clean fuel for use in solid oxide fuel cell auxiliary power units for diesel trucks.

Project Description

Goal: The objective of the proposed program is to develop and test a prototype FPP that efficiently and safely converts diesel fuel into a clean fuel suitable for a SOFC auxiliary power unit.

Diesel fuel is a challenging fuel to use in fuel cells because it has heavy ends with cyclic aromatics that transform into carbon deposits and gums and block passages and deactivate fuel reformer and fuel cell reactor elements. In addition to heavy ends, diesel fuel also contains sulfur compounds and inorganic contaminants that can poison fuel cell reactor elements. The project approach is to use a fuel preprocessor to remove these problematic compounds from the fuel. Diesel fuel is pumped from the fuel tank to the fuel preprocessor, where the fuel is upgraded and cleaned. The clean fuel is transported to the fuel cell that produces the needed auxiliary power. The fuel residue is returned back to the fuel tank. By recycling the fuel residue back to the fuel tank the FPP does not have any fuel penalty. The FPP is projected to be one cubic foot in volume, weigh 1.5 pounds and produce 0.6 gal/hr clean fuel.

Progress and Milestones

The following are the main tasks to be performed:

- Define the system specifications for the FPP, perform process calculations, design all the FPP components, and integrate all components to create the integrated system design.
- Design, fabricate, instrument and test the flexible FPP prototype. Analyze test results and improve each component as needed. The integrated prototype system will combine all the elements developed and tested under this task to produce the FPP integrated prototype.
- Evaluate the performance and cost of the FPP integrated prototype. This information will be used to define the economic impact of the FPP/SOFC auxiliary power unit on the trucking industry.

Economics and Commercial Potential

The FPP will have many applications in the fuel cell industry. It will make fuel cells more fuel flexible, and as result, when developed it will generate considerable interest from different sectors of the fuel cell industry who will be willing to license, invest and commercialize the technology. Commercial introduction of the technology is expected by 2005. Annual energy savings by 2010 would be 2.4 trillion Btu. By 2020 the savings would grow to 21 trillion Btu.

The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and to conduct early development. Ideas that have significant energy-savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

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